17 Fractures of the Tibia

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17.1 Introduction

The management of the tibial fracture remains controversial despite advances in both nonoperative and operative care. Orthopedic opinion is often cyclic, and in no area of orthopedic endeavor is this better seen than in the management of the fractured tibia. Orthopedic surgeons with an interest in orthopedic history would be well advised to study this particular fracture which reflects the cyclic changes in opinion so clearly.

During our orthopedic residency and careers as clinicians, we have been subjected to this full cycle. During our residency, we were taught that most tibial fractures were best treated by open reduction and internal fixation; unfortunately, the surgery was often inadequately performed and indifferent results were achieved, with many serious complications. This, in turn, led to an extreme nonoperative approach, championed on the North American continent by Dehne (Dehne et al. 1961) and Sarmiento (1967). In the preceding era, this nonoperative approach had been popularized by Böhler (1936) of the Viennese School.

The introduction of the AO/ASIF method of fracture care led to a renewed interest in internal fixation based on sound biomechanical and biological principles. In the hands of the AO/ASIF surgeons, marked improvement was reported in the results of operative fracture care (Allgöwer 1967). However, many problems remained.

It is obvious that there is no perfect method of treating all tibial fractures. Different circumstances demand differing approaches to the same problem. At the present time, improved methods of both nonoperative care of the fractured tibia, using functional casts, cast braces, or splints and operative care, using the principles and implants of the AO group (Müller et al. 1979), where indicated, should allow decision making to be based on logical principles, which in turn should resolve the so-called controversy of the fractured tibia. We should reject the theories of dogmatists which state that "all tibia fractures must be treated nonoperatively" or, conversely, that "all tibia fractures should be treated operatively." It is time to remove this type of dogma from our thinking and to individualize the treatment for each patient.

Logical management of any tibial fracture can only flow from a precise knowledge of its natural history. For the individual case, the natural history is dependent upon the personality of the particular fracture to be treated. Once the personality has been determined by a careful clinical and radiographic assessment, and compared to the natural history of similar fracture types, a treatment protocol for that particular patient will become relatively clear. This knowledge will also allow the surgeon to carefully weigh and balance the alternative methods of management and clearly outline them to the patient. Where clear-cut alternative treatment methods exist, the surgeon should not play God, but should allow the patient to share in the decision-making process.

17.2 Natural History

Most fractures of the tibia will heal if treated by nonoperative means – this fact is undeniable. Watson-Jones (1943) has stated that "if immobilized long enough, all fractures will eventually heal."

Charnley (1961) stressed the importance of the soft tissue hinge on the healing process of the tibial fracture. He recognized that fractures with an intact periosteal hinge did well, whereas those with gross displacement, indicating complete periosteal rupture, did less well. He recommended primary surgery for the tibial fracture with an intact fibula and for any tibia with a gap at the fracture following reduction. Astutely, he recommended early bone grafting procedures for fractures with predictably poor results.

Nicoll (1964), in a definitive study of 705 tibial fractures treated prior to the widespread use of
the early weight-bearing method, was able to clearly describe the natural history of the tibial shaft fracture treated nonoperatively. It was he who coined the term “personality of the fracture”, by which the eventual outcome of each case could be predicted. The major factors affecting the outcome were:

1. The amount of initial displacement
2. The degree of comminution
3. The amount of soft tissue damage in the open fracture
4. The presence or absence of sepsis

The incidence of favorable outcome for fractures managed by nonoperative means ranged from 91% in the “good personality” types to 61% in the “poor personality” types, and to only 40% if sepsis was involved. These figures indicate a significant complication rate with many poor functional results in all categories. In order to improve upon these results, two major schools of thought evolved, one stressing the importance of early weight bearing to the ultimate function of the limb, the other, the importance of stable internal fixation.

### 17.2.1 Nonoperative School

Böhler (1936) had recommended that all major tibial fractures be treated with skeletal traction for 3 weeks followed by a weight-bearing plaster cast until healing was complete. However, Watson-Jones and Coltart (1943) clearly showed that traction for tibial shaft fractures had a deleterious effect on the rate of union.

Dehne eliminated the preliminary period of skeletal traction, and instituted immediate weight bearing for the patient in a long leg cast with the knee extended. In 1961, he and his colleagues reported good functional results with no nonunions.

**Fig. 17.1** Nonoperative management of a spiral tibial fracture. **a, b** Anteroposterior and lateral radiographs of a 59-year-old woman showing a markedly displaced fracture of the tibia and fibula. Note also the undisplaced butterfly fragment. Closed manipulation under general anesthesia and plaster immobilization for 12 weeks resulted in firm bony union and an excellent functional result with shortening of only 1.1 cm (**c, d**)